## CLAIMS

What is claimed is:

1. A direct current to direct current voltage converter (DC-DC converter) comprising:

a transformer coupled with a voltage source;

a self-starting oscillator that includes:

a secondary winding of the transformer;

a capacitor;

a first switch coupled to conduct current from the DC source via a primary winding of the transformer, the first switch being a normally closed switch; and

a second switch coupled to conduct current in parallel path with the first switch, the second switch being a normally open switch having a lower saturation resistance than the first switch.

2. The DC-DC converter of claim 1, wherein the transformer has a secondary turns to primary turns ratio of approximately thirty to one (30:1).

3. The DC-DC converter of claim 1, wherein the first switch is one of a junction field effect transistor and a depletion mode metal-oxide semiconductor field effect transistor.

4. The DC-DC converter of claim 1, wherein the second switch is an enhancement mode metal-oxide semiconductor field effect transistor.



McDONNELL BOEHNEN
HULBERT & BERGHOFF
300 SOUTH WACKER DRIVE
CHICAGO, ILLINOIS 60606
TELEPHONE (312) 913-0001

5. The DC-DC converter of claim 1, further comprising:

a programmable control circuit coupled with the first and second switches, wherein the control circuit effects opening and closing of the first and second switch based, at least in part, on a stepped up voltage potential generated by the DC-DC converter.

6. A direct current to direct current voltage converter (DC-DC converter) comprising:

a transformer having a primary and a secondary winding;

a resistive-capacitive circuit coupled with the secondary winding;

a first switch having a control terminal coupled with the resistive capacitive circuit, the first switch being further coupled with the primary winding and a ground terminal, the first switch comprising a normally closed switch; and

a second switch having a control terminal coupled so as to control the generation of a stepped-up voltage based, at least in part, on an output voltage of the DC-DC converter, the second switch being further coupled with the primary winding and the ground terminal so as to conduct current in a parallel path with the first switch.

7. The DC-DC converter of claim 6, further comprising a control circuit coupled with the control terminal of the first switch, the control terminal of the second switch and an output voltage terminal of the DC-DC converter, wherein the control circuit controls the operation of the first and second switches based, at least in part, on the output voltage of the DC-DC converter.



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CHICAGO, ILLINOIS 60606
TELEPHONE (312) 913-0001

8. The DC-DC converter of claim 7, wherein the control circuit comprises:

a programmable controller coupled with the output voltage terminal and the second switch; and

a charge pump circuit coupled with the programmable controller and the first switch.

9. The DC-DC converter of claim 6, wherein the primary and secondary windings of the transformer each comprise a positive terminal and a negative terminal;

wherein respective first conduction terminals of the first and second switches are coupled with the negative terminal of the primary winding; and

respective second conduction terminals of the first and second switches are coupled with the ground terminal.

10. The DC-DC converter of claim 9, wherein the positive terminal of the secondary winding is coupled with the control terminal of the second switch and the resistive capacitive circuit.

11. The DC-DC converter of claim 9, wherein the positive terminal of the primary winding is coupled with the negative terminal of the secondary winding.

12. The DC-DC converter of claim 6, wherein a turns ratio of turns of the primary winding to turns of the secondary winding is approximately one to thirty (1:30).



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TELEPHONE (312) 913-0001

13. The DC-DC-converter of claim 12, wherein the primary winding comprises eight turns and the secondary winding comprises two hundred forty turns.

14. The DC-DC converter of claim 6, wherein the first switch comprises one of an n-type junction field effect transistor and a depletion mode metal-oxide semiconductor field effect transistor (MOSFET); and

the second switch comprises an n-type enhancement mode complimentary MOSFET.

15. The DC-DC converter of claim 6, further comprising a rectifying device coupled with the secondary winding and a charge storage device for storing a stepped up voltage, the charge storage device being coupled with the rectifying device.

16. The DC-DC converter of claim 15, wherein the rectifying device comprises a diode; and

the charge storage device comprises a capacitor coupled with, and between, the diode and the ground terminal.



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TELEPHONE (312) 913-0001

17. A direct current to direct current voltage converter (DC-DC converter) comprising:

a transformer having a primary and a secondary winding;

a resistive-capacitive circuit coupled with the secondary winding of the transformer;

a first switch having a control terminal coupled with the resistive capacitive circuit, the first switch being further coupled with the primary winding and a ground terminal, the first switch comprising a normally closed switch; and

a second switch having a control terminal coupled with the secondary winding, the second switch being further coupled with the primary winding and the ground terminal, the second switch comprising a normally open switch that is coupled so as to conduct current in a parallel path with the first switch.

18. The DC-DC converter of claim 17, wherein the primary and secondary windings of the transformer each comprise a positive terminal and a negative terminal, the positive terminal of the primary winding being coupled with the negative terminal of the secondary winding.

19. The DC-DC converter of claim 18, wherein the primary and secondary windings of the transformer each comprise a positive terminal and a negative terminal;

wherein respective first conduction terminals of the first and second switches are coupled with the negative terminal of the primary winding; and

respective second conduction terminals of the first and second switches are coupled with the ground terminal.



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CHICAGO, ILLINOIS 60606
TELEPHONE (312) 913-0001

20. The DC-DC converter of claim 18, wherein the control terminal of the second switch is coupled with the positive terminal of the secondary winding.

21. The DC-DC converter of claim 17, further comprising a rectifying device coupled with the secondary winding and a charge storage device for storing a stepped up voltage, the charge storage device being coupled with the rectifying device and the ground terminal.

22. The DC-DC converter of claim 21, wherein the rectifying device comprises a diode; and

the charge storage device comprises a capacitor.

23. The DC-DC converter of claim 17, wherein the first switch comprises one of an n-type junction field effect transistor and a depletion mode metal-oxide semiconductor field effect transistor.

24. The DC-DC converter of claim 17, wherein the second switch comprises an n-type enhancement mode complimentary metal-oxide semiconductor field effect transistor.



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CHICAGO, ILLINOIS 60606
TELEPHONE (312) 913-0001

25. A direct current to direct current voltage converter (DC-DC converter) comprising:

a transformer having a primary and a secondary winding;

a resistive-capacitive circuit coupled with the secondary winding;

a first switch having a control terminal coupled with the resistive capacitive circuit, the first switch being further coupled with the primary winding and a ground terminal, the first switch comprising a normally closed switch; and

a second switch having a control terminal coupled with a control circuit that controls the DC-DC converter based, at least in part, on an output voltage of the DC-DC converter to produce a stepped-up voltage on an output voltage terminal of the DC-DC converter, the second switch being further coupled with the primary winding and the ground terminal so as to conduct current in a parallel path with the first switch.

26. The DC-DC converter of claim 25, wherein the control circuit comprises:

a programmable controller coupled with the output voltage terminal and the second switch; and

a charge pump circuit coupled with the programmable controller and the first switch.

27. The DC-DC converter of claim 25, wherein the primary and secondary windings of the transformer each comprise a positive terminal and a negative terminal;

wherein respective first conduction terminals of the first and second switches are coupled with the negative terminal of the primary winding; and



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300 SOUTH WACKER DRIVE
CHICAGO, ILLINOIS 60606
TELEPHONE (312) 913-0001

respective second conduction terminals of the first and second switches are coupled with the ground terminal.

28. The DC-DC converter of claim 25, further comprising a rectifying device coupled with the secondary winding and a charge storage device for storing a stepped up voltage, the charge storage device being coupled with, and between, the rectifying device and the ground terminal.

29. The DC-DC converter of claim 28, wherein the rectifying device comprises a diode; and

the charge storage device comprises a capacitor.

30. The DC-DC converter of claim 25, wherein the first switch comprises one of an n-type junction field effect transistor and a depletion mode metal-oxide semiconductor field effect transistor.

31. The DC-DC converter of claim 25, wherein the second switch comprises an n-type enhancement mode complimentary metal-oxide semiconductor field effect transistor.



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300 SOUTH WACKER DRIVE
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TELEPHONE (312) 913-0001